# Parallel Acceleration of Energetic Electrons in a Solar Flare

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Particle acceleration in space environment such as Earth's magnetosphere and solar corona is a longstanding problem. In solar flares, the hard X-ray (HXR) emission, appeared at both ends of the magnetic loop, is a signature of precipitation of accelerated electrons into the chromosphere. However, a mechanism for accelerating electrons is not clarified yet. To discuss the acceleration mechanism, determination of the direction of acceleration with respect to magnetic field lines is important.

Due to the asymmetry of the flare loop, the observed HXR sources often show asymmetry (Sakao 1994): brighter HXR source is located at the footpoint with weaker magnetic field. Such HXR asymmetry can be explained in terms of the transport effect (magnetic mirror) of parent electrons. However, there are also reported flares in which HXR asymmetry could not be explained by the electron transport effect only (Goff et al., 2004; Alexander & Metcalf, 2002). In such cases, additional mechanism, e.g., acceleration and subsequent change of the electron pitch-angle distribution, should be taken into account.

We observe a solar flare occurred on 2003 May 29 by RHESSI and Nobeyama Radioheliograph. In the rise phase, this flare shows the non-thermal sources at the double footpoints of the large sheared loop. Comparing these double footpoint sources, we find: (1) lower energy electrons preferably propagate toward the footpoint with stronger magnetic field; and (2) the emissions from this footpoint located far from the flare main site lead those from the conjugate footpoint located close to the main site. We consider this feature as a consequence of electron acceleration in the direction parallel to the magnetic field line. We model the electron acceleration by using the electron continuity equation in energy and pitch-angle space, and then verify our hypothesis.